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Uniform System of Milk Inspection.*

By Lt.-Col. J. W. Brittlebank, C.M.G., M.R.C.V.S., D.V.S.M., Manchester.

When I was first invited to read a paper on such a subject I hesitated long, and thought seriously before I decided to attempt the task, and let me say here and now, it was probably only because so distinguished a personage as Colonel Gerald Leighton, M.D., had accepted the Presidency of our Section, that I felt compelled to try to accede to his wishes in this direction. I think we may here congratulate ourselves again in finding Colonel Leighton in the position he occupies to-day, in that it marks another step in the march of progress our profession is making in the field of public health. We have been too long a somewhat isolated profession. Our capacity for rendering service in the field of public health, I venture to say, is too obvious to require much reiteration by me, but we have to recollect that the whole scheme in this important field necessitates the harnessing of workers into teams with the guarantee that each section of the team is going to pull his full load, that petty jealousies will at no time be allowed to intrude to render the work valueless.

In asking me to draw up proposals in the establishment of a uniform system of milk inspection, I am afraid that the Committee, or whoever was responsible for the title, lost sight of one essential weakness in human nature, and that was, that however uniform a scheme may be in its provisions, humanity is incapable of uniformity, nor indeed, is true uniformity possible where conditions are so diverse. Real uniformity may be attempted in administration. No one will question that, at any rate, some degree of uniformity in administration is essential to success, and I feel sure nobody will differ with me when I say that for many years past, this aspect of our work has suffered most from the multiplicity of opinions expressed and the variety of methods suggested for dealing with so complicated and difficult a question and, unfortunately, many of the more responsible advisers have lost sight of the fact that the successful production of milk is a highly commercial problem which can only be handled, altered or interfered with, after very serious consideration and appreciation of all the difficulties involved. The problems of the milk producer are probably no more difficult than are those of the milk distributor, but it cannot be said that they run on parallel lines. I am further of opinion, speaking generally, that repressive legislation in either direction is highly dangerous and that the greatest hope that we have for improvement is that which may have its origin from within the two sections of the trade itself.

I do not propose to attempt anything like a complete survey or review of the conditions necessary to secure uniformity of inspection but, in the light of a now long experience in the supervision of milk production and distribution, I venture to make certain suggestions.

Sources of Production.—Dealing first of all with the sources of production, we note that a very large number of the farms concerned with milk production are insanitary in the extreme. Their buildings are dark, ill ventilated, overcrowded and are so constructed as to make cleanliness almost impossible. Obviously, in conditions such as these, the production of clean milk is quite impossible. The prevention of disease is equally impossible, and it therefore appears to me that, in the first place, it is imperative that these general conditions should be amended. In these days when financial resources are so limited, it is ridiculous to suggest that action should be taken on any complete or drastic lines. We are compelled, however keen reformers we may be, to have a large sympathy with the milk producer who finds himself in so difficult a position, and any requirements which we may lay down must be such as will not interfere, with undue harshness, with the conduct of a man's business, but if a careful survey is taken of the whole position and a careful preliminary survey or inspection of farms is carried out, such inspection to include a complete and accurate record of all the necessary details such as measurements, cubic capacities, means of ventilation and light, then, I think, it is quite simple to embark upon a gradual process of reconstruction, spread, we will say for the purposes of discussion, over a period of ten years, so that the end of that period might see a complete sanitary reconstruction of all cowsheds. The survey should include all arrangements for the handling of milk preliminary to its despatch to the distributor. In this scheme no palatial buildings would be required, for it is surprising how much can be done if a little ingenuity is exercised in securing the improvement of existing insanitary buildings. I would regard it, in the first instance, however, as essential that all milk producers should be licensed, and on those farms where the conditions were such as to render the production of reasonably clean milk an absolute impossibility, the license should be refused until such time as some reasonable reconstruction and improvement had taken place. The percentage of such farms, however, would not be very high. It would be essential to the success of such a general progressive scheme to require that the official standard be not an unreasonably high one at first.

It would be, in my opinion, in the first place, necessary to classify all farms into three groups, which,

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for purposes of our discussion, we may take to be Grade A, Grade B, and Grade C. In Grade A would be placed all those farms of which a satisfactory report had been received of (1) the health of the cattle, (2) the management, (3) the methods of milking, (4) the satisfactory provision for cooling and keeping milk, (5) the proper provision for the cleansing of all milk vessels. In my opinion, no milk from any class below this should be permitted to be sold raw for human consumption. Grade B would contain farms which obviously were not fit to be included in Grade A, and here I am of opinion that all milk produced from farms in this category should not be allowed to be sold for human consumption unless and until it has been treated to render it safe. If such a procedure were adopted, and I am not prepared to admit that there is any serious check in carrying it out, it would be necessary to supply conveniences for pasteurisation. This could be done either by the farmers themselves or preferably by the public authority supplying the requisite size of plant necessary to each area where farmers' milk could be brought and pasteurised at a small charge, prior to its distribution for consumption, and this would not matter whether it was for local consumption or whether it was for despatch to the distant town or city. The same conveniences could be utilised for all. Farmers in this category would require special supervision and special assistance and every farmer should be encouraged to secure such necessary improvement as would secure admission into Grade A class. In Grade C would be included those farms of which the conditions were such as to render the production of a reasonably clean milk an impossibility and such farms should not be licensed at all; but it is felt that they should be included in the scope of the work done to secure a gradual improvement so that any such farmer may gain admission into Grade B, and ultimately into Grade A.

In following out any such scheme it must be understood that in the first instance considerable elasticity of interpretation would be necessary so that the number of farmers in a category such as C, would be very small indeed. Having referred to the classification which appeals to me, let me just refer briefly to the veterinary inspection of all farms in categories A and B, more particularly the former. In carrying out the examination of these farms it will be necessary to insist that every animal is properly examined and that particular care is taken in the examination of all udders, as in this particular class the milk is to be sold raw, and as a further precaution, and controlling the clinical examination of stock, there should be frequent samples of mixed milk taken from all farms graded A for biological examination, so that if any early case of disease, such as tuberculosis of the udder, may be present which is not capable of being diagnosed by ordinary careful clinical methods, it would not be in existence long before attracting special attention.

The general supervision of farms in this class should, in my opinion, be very far reaching and should include as a minimum to the other requirements, a regular and systematic disinfection of all buildings used for the housing of cattle. No matter how perfect the conditions of construction may be, this I regard as an essential minimum.

The pasteurisation of milk from farms in Grade B would be in accordance with the conditions as laid down in the Milk (Special Designations) Order made under the Milk and Dairies (Amendment) Act of 1922. It must be here generally understood that I regard pasteurisation as merely an expedient and in any district where the number of farms remaining in this Grade remains large, I will be prepared to say that it is due to faults in administration, but it is obviously a necessary precaution that the present stream of tuberculous infection which is reaching the consumer *via* milk should be intercepted in an efficient and reliable manner.

I need scarcely say that in the carrying out of all this work of inspection it will be necessary to retain the services of the majority of the veterinary surgeons in practice, but for purposes of supervision there should be at the head of such services, in each County, a whole-time experienced veterinary officer who would check the work, control the records and direct the methods employed. This whole-time officer would be the intermediary between the inspecting or executive service and the controlling head of the public health services of the County as a whole. I repeat at this point that, at any rate for many years to come, all these services should be whole-time services, and that, as far as possible, the inspecting work should be done by the practising veterinary surgeons who are of necessity experienced clinicians. It must not be supposed that I would advocate the retention of any person who proves inefficient, and it would therefore be necessary to take stock from time to time of the results of the individuals' work.

The next point for consideration is the question of milk carriage. This is a very serious aspect of the work which may be well included under the heading of milk inspection. Milk is conveyed at present by rail, road motors or by horse-drawn vehicles. The churns into which milk is put at present are principally of a most unsatisfactory type and it will be quite obvious that, however satisfactory the precautions taken at the sources of production may be, unsatisfactory methods of conveyance may result in nullifying all the preliminary precautions which have been taken. Milk vessels which are badly dented and have badly fitting or sunken lids and containing so-called ventilating openings are to be seen daily in their thousands. These should be replaced as quickly as possible with satisfactory vessels of an improved type for conveyance. If milk is carried any considerable distance, the Railway Authorities should be required to provide properly constructed refrigerator vans for the purpose. In my experience I have found the conveyance of milk by road motors very often unsatisfactory, although even here some improvement may be achieved by covering the lorries with sheets of sail-cloth which have been well wetted at the starting point.

Now we come to the distributor. The changes taking place throughout our big cities are far reaching and will ultimately be of much advantage to the trade. The sooner milk distribution is taken out of the hands of the many people who are not concerned with it and who conduct mixed businesses, where they sell many articles of commerce which in their distribution are likely to contaminate milk, the better it will be for the consumer. Milk distribution should be in the hands of persons licensed only for that purpose and for the sale only of other articles of dairy produce. They should have properly equipped premises which are easily cleaned, having impervious floors and walls with smooth surfaces, and be provided with an ample supply of water and steam for the sterilising of vessels and with cold storage for the keeping of milk. Milk distribution should be confined as far as possible to bottles and unless a person is properly equipped for the cleansing and sterilising of such bottles he should not be licensed as a distributor of milk. Too frequently do we see a large open-mouthed can standing on a cart, open to collect the contaminating dust of our cities and towns. We should be empowered to stop this filthy method of distribution without delay and if such bulk distribution is required, milk should be put into enclosed vessels and drawn off from a tap, the vessels to be equipped with a satisfactory plunger to allow the milk to be thoroughly mixed before each customer is served. We, in Manchester, have carried out in the Department under my control, a very complete survey of the whole of the methods of distribution and storage and we are as rapidly as possible carrying out the principles which I have laid down to secure a general improvement which is so essential.

I have, so far, said nothing about the administration of the Food and Drugs Act in so far as it concerns the sale of milk and milk products, but I believe that the official responsible for milk should also have the administration of this clause of the Food and Drugs Act. He would then have in his possession all the information necessary to secure an efficient and complete administration of his responsibility. I do not propose to discuss seriously the work necessary under the Food and Drugs Act, but I am definitely of opinion that a producer of milk who has, say, a third conviction under this Act, should be prohibited further from holding a licence as a producer of milk for human consumption.

My audience will notice that I have not, at any point, referred to the re-introduction of the Tuberculosis Order, but it must not be supposed that I have not said anything on the subject because I do not regard it as of sufficient importance. I regard this Order as a very valuable instrument indeed, but it can be only of value to a properly co-ordinated system of regular supervision and inspection, its principal and serious weakness being that until cases are notified, no action can be taken to discover them.

In conclusion, let me say that unless there is a hearty co-operation between the producers, the distributors and the supervising authorities, I am not very sanguine about good results being obtained. Every inspecting officer should consider himself an educative medium. He should explain to the individual with whom he comes in contact, with tact and patience, the real scientific reasons which are the driving force behind his operations. He should explain to him the infectious character of a disease such as tuberculosis; he should explain to him the value of cleanliness and the economic importance of preventive methods. He should advise him on all points concerning dietetics, or, in other words, the economical feeding of his cattle. He should give his help with regard to breeding and the proper rearing of young stock and if he understands anything of farming, he should be prepared to discuss the system of cropping on farms. The different educational bodies should take a hand and I believe that if, in all agricultural districts, elementary instruction in animal hygiene could be given on broad lines, it would be of immense advantage. County Councils should provide classes for the training of all classes of persons connected with the dairy and I believe if these were properly conducted, they would be received with the greatest enthusiasm. Competitions on clean milk production should be held, especially to encourage the small milk producer, or the man who has not got elaborate, palatial premises. Demonstrations on the methods of clean milk production should be given at agreed centres throughout our milk producing areas as I am convinced, by experience, of the immense benefit derived from these demonstrations. In the counties contiguous to my city, I refer particularly to the County of Cheshire, demonstrations have been given under the auspices of the County Council and their Director of Agricultural Education, and wherever these demonstrations have been given, the farmers have attended in large numbers and nothing but profit has followed. The scoffer has disappeared. The man who said that his grandfather's methods were good enough for him is now discredited and laughed at as a fool.

I have said in the course of my paper nothing about the production of what is known as certified milk or the application of the Tuberculin Test. The certified milk movement or the production of milk from herds guaranteed to be free from tuberculosis by the application of the Tuberculin Test is a most admirable movement, as of necessity must be any movement which tends to reduce the amount of tuberculosis in our herds. While I have in view the fact that the percentage of tuberculous animals in our herds cannot be less than between thirty and forty per cent. of all dairy stock, I am not convinced that we have yet reached the point that any general scheme for the elimination of tuberculosis is a feasible proposition. We must build up to this. We must secure improvement in our methods of broadcast knowledge of the elementary tenets of preventive medicine before we can hope to reach the position which some people imagine as so easy of attainment.

Discussion.

Mr. A. M. Trotter, M.R.C.V.S., Glasgow: Permit me, in the first place, to congratulate Lieut-Col. Brittlebank on his very able paper. Lieut-Col. Brittlebank, as we all

know, has had a life experience in milk supervision, and anything that falls from his lips must be seriously considered. Some decades ago milk inspection was considered to be a very simple matter provided that the cowshed was in fairly decent order, that cleanly methods were adopted, and the cows in fairly good health; and if the milk was up to the required standard all was considered well; anyone was capable of doing milk inspection work, and hence we saw any class of man put in to do this all-important work. Things have changed now. The first bombshell to fall was when some medical officer of health attributed an outbreak of infectious disease to milk. At first, as Colonel Brittlebank has said, we had scoffers, but eventually, time after time, these epidemics were proved to be due to the milk supply, until now no one would be so foolhardy as to gainsay that milk can be the vehicle of conveying the disease from human subject to human subject. The next bombshell to fall was the issue of the result of the Copenhagen enquiry into the tubercle bacilli in market milk. The publication of this report was gone into by other investigators, and the conclusions arrived at have been demonstrated all over the world. Not only does market milk contain tubercle bacilli, but other things as well, such as butter and cheese. All these are capable of transmitting disease to the human subject. The next bombshell to fall was when Dr. Russell published his little book *Dairy Bacteriology*. That book would not now be regarded as a textbook, but when published it was regarded as a most important publication. Dr. Russell, however, did more than merely investigate several of the complaints and faults in milk, he published this little book on Dairy Bacteriology, but also imbued into his students the importance of research, and these men were scattered all over the country doing research work, and now at the present day there is no lack of literature dealing with milk and inspection of milk. The difficulty is to know what publication to follow. In fact, the number of publications that has been issued is sufficient in itself to fill a small library, and the difficulty, as I have said before, is the choice and the picking out of the wheat from the chaff. Now I take it that there are five main factors that we must follow for the betterment of our milk supply. These five factors—I am speaking as an official for a large milk-consuming centre—are largely these: human diseases, bovine disease, bacteria, dirt and the composition. Now, if you take the sediment test—and the sediment test has been claimed by many in the United States of America and Canada as being the one great factor that has caused improvement in the milk supply—the sediment test has been in vogue for many years, but the new method may be described as being an inverted bottle with a moveable bottom and a little disc arrangement whereby a little film of cotton wool can be attached to the mouth. Either a pint or a quart of milk is used, and, in order to facilitate the passage of milk, the bottom or top, as the case may be, fits closely to the body of the container, and air is pumped in, thus forcing the milk through the little disc of cotton wool. Any extraneous matter is retained by it, and inspectors usually carry out two tests, one disc being sent to the producer, and the other being retained for reference. Now, I question very much if the sediment test is all that the Americans and the Canadians claim for it, because in this country at least, large numbers of dairymen employ an improved sieve, practically on the same principle as the sediment tester, and hence a tremendous amount of filth is removed from the milk before being dispatched from the farm. Now we come to the bacterial count. The bacterial count is lauded to the skies, and even the Government authorities of this country have emphasised its importance. In my experience the bacterial count is not a test that can be relied upon because so many factors operate against the reliability of this test. It is only regarded not as an actual count of bacteria but as an estimate. Well, the medium in the first place is somewhat difficult. It is difficult to make, and is not always the same. You may make the medium from a formula, but every batch of media you make is not the same; there *is* a slight difference, or may be a slight difference, and this slight difference makes all the difference between the organisms you grow. It is a somewhat expensive test. And another point which must not be overlooked is that the bacteria found in market milk are frequently in groups; you may get as many as thirty-four in a group, or you may only get five; and hence when you make an estimate you may be dealing with an entirely different state of matters. Personally, I think so far as the bacterial count is concerned it is one that may be adopted, but not for general routine work. Colonel Brittlebank has not mentioned temperature—that I think is a rather important thing, because if you keep down the temperature of milk you practically prohibit the growth of organisms, and over in the States and in Canada they take every means possible to lower the temperature, and lower it rapidly. Of course in Canada and the upper part of the United States of America they have unlimited quantities of ice at their hand. Here in this country we have not the same cold, and hence if we were to insist upon the lowering of temperatures one would require to have mechanical means, because the water supply is not in itself sufficient to lower the temperature so rapidly as would be required. Now, we come to the composition. Over in the States and in Canada I was very much struck with the rapidity with which that was carried out. There they lifted samples of milk practically every day, but they did not send them to the analyst as we do, they took them to their own laboratory, and a very rapid method was adopted, namely, the intradermal test, which is not so accurate as the analytical method, but for all intents and purposes it gives a fair indication of the butter fat of the milk. I was also struck with the fact that the inspectors sent or communicated to the producer or to the distributor the conditions he found, with the result that it created a hearty co-operation between the three sections—the producer, the distributor and practically the consumer, represented by the official. Now, I am sorry that Colonel Brittlebank does not mention pasteurisation. He mentioned it, but it was only in dealing with milk from what he calls Grade B farms. I am afraid when you come to deal with the milk supplied to a large city such as Manchester or Edinburgh you will have to resort to pasteurisation, because you have to deal with human diseases as well as bovine diseases. I do not say that a raw milk supply is not preferable to a pasteurised milk

supply, but taking everything into consideration I am afraid that we must face up to pasteurisation. The method of pasteurisation does not interfere with the nutritive qualities of the milk, at least according to chemical analysis. Some say it destroys one of the vitamines, but I do not see how the complaint that it destroys this vitamine should have any bearing when you consider that for the greater part of the year that vitamine is absent from the milk. You only get that vitamine when the cows are on pasture, and during the whole of the winter months the milk is deficient in that vitamine, and you can always obtain that vitamine by the addition of a little juice of fruit. Now, pasteurisation is not the simple process that most people imagine. The first method of pasteurisation was what is known as flash pasteurisation. That has largely in the more up-to-date countries fallen into disuse, and now over in the United States of America and Canada they practically go in for the holding system. Now, the holding system, I think, is much better so far as we here are concerned, because by the flash process of pasteurisation you can get no record of temperatures, whereas by the holding system you can fix on a recording thermometer and that gives you a clear indication that your temperature has been maintained. Now, the temperature that they maintain is roughly from 140 to 145 degrees Fahrenheit. But then with the best of pasteurising plant you may have a swing of temperature of two or three degrees. In other words, supposing your recording temperature was 143, you may have a temperature actually of 141 or 145. The thermometer varies and requires constant attention. Undoubtedly, pasteurisation, as medical men will tell you, proved conclusively that you could practically do away with the huge outbreaks of infectious disease that we have witnessed in the past. So far as human disease is concerned, you may say that practically the whole of these diseases are notifiable, but you have always cases which are not recognised as notifiable, also cases in which we have information bearing on them, hence one may say you can cut all these human diseases out in a test. Still you cannot cut them out, and there is always the possibility of the spread of these diseases. Take, for instance, typhoid; you have had epidemics of typhoid spread by the milk supply from one of those milk carriers, and hence it is advisable that all milk be pasteurised. Another point I would like to emphasise is that the city authorities ought to have the power immediately to stop a milk supply. I know that the agricultural members of the community will be against that, but that is the most powerful factor that an inspector could have. Supposing a milk supply is continually being sent in deficient in butter fat, or is dirty or has some other fault, then the inspector ought to have the power of saying, "No, keep it outside. You can do what you like with it, but you are not sending it into this community." It is all very well for the farmer or the county authorities to say, "Why are you going to have that power?" We city inspectors ought to have that power, I hold, because we are the preservers of human life, and I think the life of one human being is infinitely of far more value than all the milk that would be rejected. Now, there is one point I would like to mention about Colonel Brittlebank's paper. Colonel Brittlebank said that down in England a great many people objected to their grandfather's methods. I would welcome one of our grandfather's methods. I do not think it is known that in Glasgow we had the first model dairy in the world. That was put up by an east country Scotsman in Bath Street in Glasgow. His methods were certainly not up-to-date, but they were a vast improvement on the methods of the present day. For instance, he weighed every cow, he measured the milk of every cow, and he estimated the amount of butter fat of every cow every week; he had special methods of sealing his cans, and everything was done in a methodical manner. The number of visitors who came to his place was so great that he had to put up a special balcony—and charge (Laughter). Well, old Harley received a piece of silver-plate from the then Highland Society as being the greatest pioneer of that industry, and titled heads came from all parts of Europe to see his methods. Just in one word I would like to emphasise what Colonel Brittlebank has stated about the necessity of hearty co-operation between all parties concerned—(Applause)—and it is only by so doing, by this hearty co-operation, that we will ever get a betterment of our milk supply. (Applause).

Dr. R. STENHOUSE WILLIAMS, B.Sc., M.B., C.M., D.P.H., National Institute for Research in Dairying, Reading: Dr. Leighton and Gentlemen, it occurred to me as I was sitting here that the feeling I had was very much the same as I had experienced more than thirty years ago, when I first sat on these back benches and trembled as I listened to Professor Brown. Having been brought up in a school which was based on the old tradition of classics and mathematics, with a little French, no history or literature, unless you felt like it, the sight of all the chemical formulæ he put before us was enough to terrify the soul of the mere man. That is pretty much how I feel now. What I would like to turn to are two points that were made both by Colonel Brittlebank and Mr. Trotter, namely, that if you want to make anything of the milk supply you have got to have the most serious co-operation. (Hear, hear). It is a notable fact that so far I have not heard so much as I would like of the co-operation that agriculture can and is giving to you. When I was over in the States at what was known as the World's Dairy Congress, with Colonel Leighton, one pathetic thing about the whole of that Congress was the fact that you saw nothing of the dairy farmer. Now, you are not going to do anything with the milk supply unless you have got the dairy farmer with you. (Hear, hear). Colonel Brittlebank has laid down what I imagine to be the real axioms of his paper, namely, that farms shall be graded according to their qualities, and I have no objection at all to that suggestion. After all it is what we have already got under the 1922 Milk and Dairies Act, only at present—and personally I think it is a wise thing—the grading is optional. That is to say, a man is at liberty to take up certified milk and bottle it at his farm. I am speaking of English conditions, of course, and in that connection I would like to say at once that I do not for one instant attempt to suggest that what is necessarily good in England would necessarily be good in Scotland. I mean exactly what I say, and for this reason, people come to us from all over the world

for advice. They come from the Continent; perhaps you will be glad to know that in Holland they are now producing, as the result of the example of this country, at their own option, Grade A tuberculin milk, and sell it. So that there is something to be said for Great Britain when people do come to us from all over the world; they come from Africa, India, and all sorts of places. And what I am able to tell those folk is this, "I can show you, because we have taken a great deal of pains to study the problem as it should be studied, how you can handle milk, at any rate, in the cowsheds. What you are going to do with it afterwards is a matter that can only be adequately studied under the conditions which exist in your own country." And that applies just as much in Scotland as between Scotland and the South of England as it does between France and England. As a matter of fact, in theory in some ways I think your problem ought to be easier than mine is in the South of England. Probably you do not get the same temperature conditions, and very likely your haulage is shorter than ours. On the other hand, your long winter may lead to greater trouble with disease in cattle. I do not know, but it might be, and all these sides must be considered. Well, I have rather got away from the point I intended to speak on, which is this, that under the 1922 Act as it exists in our country we already have as an optional system what Colonel Brittlebank is proposing should be made a compulsory system, and it may be that he is right. It may be we have gone far enough on the optional system. I would not like to be positive. But may I describe what has been accomplished under the optional system where you had agriculture behind you? Take the district in which I live; there were some of us down there who were really studying the problem in the cowshed, not so much talking about it from papers which we had read by somebody else, which is an entirely different thing, and of which there is far too much in this country. (Hear, hear). We really knew it as a business proposition, because we had taken the trouble to work it week in and week out, and control our results by these bacteriological tests which Mr. Trotter does not like, but I do. And I think he would like them too if he really worked at them as much as I do. We were able to go down into the cowsheds, and we did go down into the cowsheds ourselves, because we were in touch with the farmer, and we demonstrated to the farmer in his own cowshed—to the man who actually did the work, not some Lord who lived somewhere else and depended on some other people, but the real tenant farmer—how his work should be done, and we got him interested. As you know, as time went on, licences were granted for special classes of milk, and our farmers began to take these licences up. Now, I want to point out to you this, that when they took these licences up they had no knowledge that as the result of the new brains they had acquired there would really be a sale for their milk at the end. You people and all of us at these meetings talk very gaily, but it might astonish you to know that last week I was informed by one of the largest hospitals in England that they saw no necessity for buying fresh milk, that they could get pasteurised milk and make up the deficiency. And that is what I want you to consider. These men did the tuberculin tests of their herds, and they stood to lose whatever there might be, and we were working with them every day of the week and all the year round. They put this milk upon the market, or rather they offered the milk to the local dealers, who unanimously—and that is one of our greatest difficulties—refused to buy it. They then went to the local hospital and they offered that milk at the same price as ordinary milk, and the offer was rejected. Now, I am telling you facts, because I live in this work. I ask you once more to consider what the impression was upon those men. They then put their hands into their own pockets and opened a dairy in the town in order to get rid of the milk. You do not know the half of this work that is going on and what agriculture is doing for you. You do not know one tithe of it, and that is why I am here to tell you. They sold in 1922 in that town during the first few months three or four pints, and I think most of those pints came into my house (Laughter). In 1924, within two years, fresh milk from tested cows, Grade A tuberculin-tested milk, formed one-sixth of the total supply of the whole town, and always at an extra price. (Applause). You cannot produce milk of that calibre from tested cows, which is really clean, which is delivered in a bottle with a Government seal on the top, at the ordinary rate of ordinary milk. The consumer, he finds, is not nearly so scared of epidemic diseases as we are on this platform; he does not understand them; he does not know the horrors of tuberculosis as I do, for instance, who worked on tuberculosis for a number of years. Perhaps it is as well he does not. But the real thing that sells that milk is this—it is what happened to a dealer in our town. A woman came to him one day and said to him, "Mr. Davis, my milk has gone sour three days running. I am wondering if I would not be wiser to pay the extra price and get a pint from you." She took a pint for a week, and at the end of the week that pint was a quart. It is the keeping qualities that really sell the milk, not so much the fear of disease, although I cannot pretend that milk cannot carry disease, and that it is not up to us to eliminate disease from milk. I am trying to point out to you what the farmer is doing on your behalf, not only in the district from which I come but in other districts in England and Wales, and, as I happen to know, around Edinburgh also. Now, how is that work accomplished? You know we could lay down any regulations we pleased, and they will be as dead as Queen Anne unless we have the time, the knowledge and the interest that goes for the successful handling of milk. You cannot control milk by inspection beyond a point. You might as well try to control the operating theatres of our hospitals on a system of inspection, and it would be an easier job, because there are fewer of them and they do not work so continuously as we do. To make the problem a success you have got to remember the man must be prepared to wash his cows and adequately to sterilise his utensils at 5 o'clock in the morning, even on a winter's day, 365 days in the year, and he has got to do it again in the afternoon, and in some places he will have to do it three times a day. If he does not do these things he won't get his results. I speak of what I know; I remember once in Liverpool I heard Professor Beattie get up and say, "Oh, you will never control milk unless

you inspect every farm." And I said to him, "God go with you. You will need an inspector for every six farms at least, and he will have to be there at 5 a.m. How will he like that?" The thing is not feasible beyond a point. The real success of this movement is going to come partly from inspection but much more from us—people like me—who work right inside the industry and create that atmosphere which is too proud to send out indifferent stuff. (Applause). I remember not so many years ago when some of my colleagues went and gave a clean milk demonstration at the Oxfordshire Show, and the whole world laughed. They were amused to death at us. And that was only four or five years ago. At the present moment, as Colonel Brittlebank will tell you, there are clean milk demonstrations being given at nearly every agricultural show held in England and Wales. In 1920 Essex was the only county in England that held a clean milk competition. Think of it. In 1921 there were two such counties. In 1922 there were only three, I think. In 1925 there were 33 out of the 52 in England holding clean milk competitions. (Hear, hear). And that does not represent by any means the whole lot, because some of the counties had more than one competition. What I am trying to get at is to make you realise what people like ourselves who work inside are really doing on your behalf to help things along. Now, that is not the whole of it, because this movement has been run up to date entirely on an optional system, which has meant that those who come in must make it pay, and it is right that they should. (Hear, hear). I have no use for these artificial propping arrangements in getting on with this job. It is a business proposition and should be made so (Hear, hear). It means that the farmer is finding that it does pay, and there can be nothing better both for you and for me and for all of us than that that should be so. What is he getting out of it? I will tell you some of the things he is getting out of it from his point of view. First of all, he is getting a better price for his milk, and he deserves it. (Hear, hear). Secondly, he is getting a very much healthier herd, and he is finding that out. And thirdly, he is getting much more intelligent labour in many other directions by virtue of the new bit of knowledge he has introduced on to his farm. He finds that that bit of extra knowledge pays him back in many other directions besides the handling of the milk. And, last of all, he is getting what must be a joy to him, as it is to you and me, the sense that he is really doing his job as well as he knows how to do it. (Applause). One other thing I ought to tell you about is this, that recently the Ministry of Agriculture—I am speaking of it as it is in England; and the Board of Agriculture in Scotland I know is equally interested—the Ministry of Agriculture in England is endeavouring to set up, and has set up at the various colleges, because this work really started from one centre originally, throughout the country people who are prepared to carry on in their own districts work similar to that which I have described to you, so that there may be situated locally all over the country somebody to whom the farmer or dealer may turn when he is in trouble and get advice right down to the cowshed and dairy when he needs it. Those are things that agriculture is doing for you, and if you were with me I believe you would be amazed at the extent of the work that is going on throughout the country. But there was one last point I wanted to make before I sat down, and it is this—the greatest success that has attended this movement has been in two or three different places so far as England is concerned. That greatest success, where it has occurred, has, I believe, been due to these simple facts, primarily that you had some one locally whose first duty was agriculture, who was really serious in this proposition and prepared to take his knowledge to anyone who wished to have it, not only in the sense of sitting in a room and writing a report, but going right down to the cowshed and talking with the workers, the real workers, who were doing the milking, talking things over with them in the evening, and doing that again the next day. You will be amazed how a farm can be completely revolutionised by such a procedure. (Hear, hear). The second factor is this—and it is one in which we are most amazingly fortunate in the town in which I live—the medical officer of health and the veterinary surgeon of the district are working in the closest possible collaboration. There is no feeling between them and those who represent agriculture. You see you have got the whole three factors there working together for a common end, and you get this result. Remember in this country and in England our haulage is short; in New York you haul milk 300 miles and think nothing of it. In England if you haul milk 300 miles you are into the North Sea, but it is a fact, and a most important fact, that in New York people die of heatstroke, and you do not hear of people dying of heatstroke in this country; our temperature conditions are most favourable, and they ought to be more favourable, I should think, in Scotland. In England, and I believe it is true in Scotland—although I am not so sure of the Board of Health in Scotland—we have what I believe to be the pioneer country in public health. We have not got the same terrible danger of epidemics as they have in the States. The death rate from typhoid in the States is six times higher than it is in England, and when I talked with Dr. Park in New York, it was typhoid he was fearing quite obviously, and when I talked with people who were in charge of welfare work in New York, their great trouble was being able to follow into the remoter districts and get adequate sanitary arrangements in those districts. This is an older country and well established, and the dangers from epidemics are not so great. These are all factors that must be taken into account in this work, and there is no doubt at all that if we can give our people a fresh, wholesome milk supply, free from treatment, then we ought to do it. (Hear, hear). I believe we can do it. I do not believe we can do it in five months, and I do think it would be a very wrong procedure in this country if we were to allow our milk supply to fall into the position of the New York supply where it is impossible for me, as a consumer, to purchase fresh milk except at a price which I cannot pay. After all, we have got to consider that side of the question. What is the ultimate result of twenty years' work in New York? The result is that 2 per cent. fresh milk is certified at a price which I cannot pay, and the remainder, 98 per cent., is pasteurised. If as the result of twenty years in

this country I could not attain anything better than that I would be a very sorry man. (Applause).

Mr. W. W. KELSO, Sanitary Inspector, Paisley: Mr. Chairman, ladies and gentlemen, it must be very gratifying to members of local authorities throughout Scotland to know that the profession represented on the platform this morning has at last wakened up to the fact that something must be done towards the problem whch we are discussing this morning. Referring to the last two lines of the first paragraph of your paper, Colonel Brittlebank, you suggest that petty jealousies in this question of a clean milk supply should be altogether discarded in the interests of the general public. With that I perfectly agree, and, speaking as a sanitary official, we welcome your profession into the ranks of our profession. But we say, "Keep to your own bit." (Laughter). Now, this is not the first time that our line has been attacked; it was attacked many years ago by another profession, and I may tell you, if you are not aware, that we were able to withstand that attack, and we hope to be able to withstand this too. So far as the inspection of dairy premises is concerned, I hold that that is not a matter that falls at all to the lot of the veterinary inspector. I have not the honour of knowing Colonel Brittlebank personally, and I do not know what his qualifications may be, but I make bold to say that not one of his profession in Scotland have the qualifications to inspect dairy premises—I mean from the structural aspect. What is the history of the milk supply in Scotland? If anything has been done at all to bring about improvements in it it has been done by the sanitary officials in this country. (Hear, hear). It is only within the last year or two that we have had any expression at all coming from the profession represented on the platform as to a clean milk supply. The inspection of cattle certainly should be in the hands of veterinary inspectors, but when it comes to the inspection of the premises or of the milk it is a different matter altogether. I think I heard you yourself, Mr. Chairman, giving expression to a thought that has struck deeply in my mind, that milk was never intended to be thrown about in the open way it is. It is a remarkable thing that people think so little of the way in which milk is thrown about in a loose, dirty way, in a way in which I venture to think any other fluid is not handled, and when we think of that it is surely incumbent upon those in authority to see that something is done whereby it will be delivered in a cleaner form than it is at present. Quite recently I carried out an examination of all the milk produced in the burgh I represent. At each of the dairies the inspectors were in attendance, saw each cow milked, saw the milk taken to the milk-house and took a small sample of each cow's milk. After the milking was over of the whole herd, the milk was put together, thereby getting a sample of the whole herd, and the results, both with regard to dirt content and chemical ananlysis, were astonishing. I am speaking of milk produced in the town. The average all over was as good as that of certified milk. Only in one case did we get any trace of tubercle. On examining the cattle at the dairy in question we found there had been a change in the cows, five had been sold, and on testing the remainder we found they were free from tubercle, so that, presumably, one or more of the five that were sold, were the ones that were giving the tubercle. Now, without worrying you too much, I think the time has arrived when we ought to have a dirt content standard. After what Mr. Trotter has said about the unreliability of the bacterial count, I do not know what else we are going to rely on. At any rate, I think we ought to have a standard; in fact, I would press very, very strongly for a standard of dirt content. I would also press, where reasonably practicable, to have the milk cooled and bottled on the premises. In this country of ours, except perhaps during the weather we have had for the last month or six weeks, the temperature is not so high as to affect it. I do not know that I can say much more; I would conclude by joining heartily in welcoming Colonel Brittlebank and the other members of the profession into our ranks, but, at the same time, I say, "Hands off the sanitary inspectors." (Applause).

Mr. JAMES CUMMING, Sanitary Inspector, Aberdeen: Mr. Chairman and gentlemen, the ground covered has been so vast that I intend to confine my few remarks to one aspect, namely, the procuring of samples under the Food and Drugs Act. I quite agree with Colonel Brittlebank's statement that if a producer is three times convicted for selling milk under the standard he should not be allowed to sell milk at all. At the same time, I am practically of the opinion it is the duty of the sampling officer to satisfy himself, as far as he can, that the milk has been tampered with. There is no doubt we get samples of milk that are under the standard and yet are genuine. A few weeks ago, in the north of Scotland, a farmer carrying on business on a large scale, was charged with supplying a creamery with sixty gallons of milk containing 2.99 per cent. of fat. Evidence was led at great length. The public analyst for the prosecution had no hesitation in saying that it was watered. An analyst appeared for the other side and stated in his opinion it was not. Well, I have had a fair experience of taking samples at byres, and I must say that on the figures I am not prepared to say whether that milk contained added water or whether it was genuine as it came from the cow. To illustrate my point, I would like to give you some actual *data*. On the 30th of September last, we procured at the station in Aberdeen a consignment of 30 gallons of milk which was ceritified to contain 3.48 per cent. of fat and 8.29 per cent. of solids other than fat. Following my usual practice I visited the byre that evening and learned that the consignment consisted of the evening milk produced at the farm and also the morning milk. I procured a sample of the evening milk, came back in the early morning and procured a similar sample. The herd consisted of seventeen cows, a fair size of herd in our district. The evening milk was found to contain 3.62 per cent. of fat and 8.24 per cent. of solids. The morning milk was richer in fat—3.99 per cent. of fat and 8.32 per cent. of solids. As regards the greater amount of fat in the morning milk, it is but right to state the milking intervals were 6 p.m. and 5 a.m. Now, you might say that that is an isolated instance, but it is not. Since 1914, I have procured samples of mixed herds amounting to no fewer than 150 byres, and on numerous occasions they were deficient in fat, but not until 1921 did we come across a case that was deficient in anything other than fat. On 17th September, 1921, a mixed sample of evening milk from a herd of forty

cows was taken and it was found to contain 3.38 per cent. of fat and 8.48 of solids. Another herd, a small herd of six cows, was found to contain 3.25 per cent. of fat and 8.23 of solids. The morning milk of the same herd was 3.68 per cent. of fat and 8.3 of solids. On 7th August, 1922, a mixed sample from a herd of twelve cows for the morning milk consisted of 4.12 per cent. of fat and 8.41 of solids. Then a few weeks later a mixed sample of the evening milk of another herd of ten cows contained 3.50 per cent. of fat and 8.32 of solids. Still another case of a mixed sample of morning milk, with a herd of ten cows, was 4.19 per cent. of fat and 8.34 of solids; while the evening milk for the same herd was 3.83 per cent. of fat and 8.44 of solids. Now, I think these figures are startling. No legal proceedings, of course, were instituted in either of the cases, but had I not visited the byres and procured these samples there would have been prosecutions. I think we are all agreed, however, that the average sample contains more than 3 per cent. of fat and 8.5 of solids. As the Chairman is aware, the question of milk prosecutions has caused the Board of Health considerable concern, and I do humbly contend that the experience gained by the present sampling officers—unless it can be proved that they have been carrying out their work in an unsatisfactory manner—is bound to result in greatly facilitating the work of all concerned. There is no doubt that the time of the sampling officer is greatly taken up in keeping in touch with the various conflicting legal proceedings, but if the milk producer is to be protected I do claim that everything possible should be done to satisfy one's self that the milk has been tampered with. (Applause).

Mr. G. Howie, M.R.C.V.S., Alford: Mr. Chairman, ladies and gentlemen, in a weak moment I promised Dr. Gerald Leighton that I would say a few words—not that I am an expert by any means in the production or distribution or handing of milk. It has just struck me in the course of this discussion, as a veterinary surgeon, that the whole aim of not only veterinary surgeons but sanitary inspectors, medical officers of health, and everybody concerned with the handling of milk, is not to produce a cooked milk but a clean, raw, healthy milk. I quite admit that, at the present moment, milk as it comes in bulk from the country farms to cities has to undergo a process of cleaning; it has to be cleaned of filth. It has to be cleaned from bacteria, but at the same time as we are cleaning it of harmful bacteria you are robbing it of beneficial bacteria. Therefore, I think that team work with all the parties concerned with the handling or dealing with milk, and free from all petty jealousies, would help to solve the problem of producing clean, raw milk, as Dr. Stenhouse Williams is endeavouring to do in Reading. (Applause).

Professor W. Brown, B.Sc., M.R.C.V.S., Lecturer on Veterinary Hygiene, University of Aberdeen: There are two things I would like to emphasise. As an unadulterated product of agriculture, I would like to say how important it would be for the success of the Act that you do not expect too much in the way of bricks and mortar. You do not require a palace to produce clean milk, and if too great insistence is going to be put upon modern up-to-date buildings you are going to knock a great number of people out of the milk trade. Now, we do not want less milk, we want more milk and more milk. (Applause). As is well known, agriculture is already so much burdened with taxation that it is impossible for either landlords or tenants to do much in the way of building new buildings. The second point I would like to make—and it is the most fundamental of all—is that clean milk is going to be produced as the result of one thing and one thing only, and that is the education of the milk producer. Now, it will be the bounden duty of the medical officer of health, the veterinary inspector and the sanitary inspector, to become actually the friend of the milk producer, and in that way, and that way only, can clean milk be produced; and I hope by educating our milk producer—and he is a very amenable man if you take him the right way—we will see the day when the word "pasteurisation" will not appear in our dictionary. (Hear, hear).

Mr. J. McAllan, B.Sc., M.R.C.V.S., Aberdeen: I want to emphasise very strongly the educational aspect of this question. Since I went to Aberdeen, I have done a great deal in the direction of the cleanliness of milk. I have taken samples every year and used the much maligned bacterial test, and I find that test is a very, very satisfactory thing in working with farmers. We have not yet had an official clean milk competition in Aberdeen, but by my own efforts I have got a very good unofficial competition going. I keep a Producer's Record Card with a complete account of each producer's milk from the first time I sampled it, and I have got the farmers interested. They send for these cards, and they are anxious to know how they are getting on. I send these cards to the different county sanitary inspectors, who use them going round the farms, and these sanitary inspectors tell me it is most interesting; farmers say, "What is my count?" They are told, "It is so and so". "How's so and so up the road?" Whether he is or not, the sanitary inspector, if he is going to do any good, says, "Oh, he is a lot better than you are." (Laughter). In that way I have got the producers in Aberdeen very interested in this question of clean milk. I would like to emphasise what Mr. Brown brought up, that the question of clean milk is not one of bricks and mortar. I get as clean milk out of places that do not look very well as out of places that look exceedingly well. With regard to the Milk and Dairies Act, I have one suggestion to make, and it is more to the veterinary inspectors, and that is, when we get this going and start going round the farms, that we should each take a very detailed account of each place, pretty much on the lines Colonel Brittlebank suggested, so that we could grade our farms to a certain extent; and I have also to suggest that a conference of veterinary inspectors on the working of this Milk and Dairies Act, when it comes in, would be beneficial. So far as I can see, there will be certain differences of opinion and certain differences of procedure which a conference of that kind might clear up. I think for whole-time inspectors, or those who are doing the work under the Milk and Dairies Act, such a conference would be very beneficial. (Applause).

Mr. H. T. Taylor, Sanitary Inspector, Kettering: I should like to thank Colonel Brittlebank for the very interesting paper which he has given us; and I would also

like to thank Dr. Williams for the very valuable information and the very good lead he has given us this morning. As a sanitary inspector, I would like to try and kill the bug that has been raised by certain sanitary inspectors here this morning, that the veterinary inspectors are trying to take away some of our duties from us. I do not think that is the idea of the veterinary inspectors. (Hear, hear). I come from a district where we have a joint inspection arranged by a committee, and a veterinary inspector is appointed to carry out the work both in the urban districts and the rural districts, but it is simply the inspection of the cowsheds and dairies, the milk shops are left to the sanitary inspector. But such is the co-ordination between the two departments that the veterinary inspector does call for my services occasionally in remedying nuisances he finds at the cowsheds, and I do feel that what is done in one district can be done in another ; and if veterinary inspectors are given extra duties they will be only too willing to work amicably with the sanitary inspectors as they have done in the past. We have heard about the production of clean milk, but there is one point which has not been mentioned, and that is the question of what becomes of the milk after it passes from the salesman to the general public. You can give the general public a clean milk, and we know that in some instances only a few seconds after it has passed from the salesman to the general public it is as highly contaminated as it can be ; so that the duty does not stop altogether in producing and distributing clean milk, but the people have to be educated as to what to do with the milk and how to keep it once they get it into their homes. We know only too well that most filthy jugs are used, and the milk is kept in unaccountable places uncovered, and, as I say, when very good milk is given to them in a few minutes it is bad. And what happens to your bottles ? We have bottled milk in my district and I have been in houses and seen children drinking out of the bottles. There is no earthly use giving these people good milk unless they are educated up to it, and that is where the work of the sanitary inspector and not so much the veterinary inspector will come in. (Applause).

Alderman WILLIAM MUIRHEAD, Chairman, Liverpool Health Committee : I did not want to say very much on this, but I have always got a fear in regard to the grading of milk, that if you make it into Grades A. and B. there is always the craze for cheapness, and I have the idea that the woman with the very limited income, the wife of the working man, may be compelled, by force of circumstances, to buy the cheapest grade of milk. Now, the fact is, as we all know, that that is just the woman that ought to be buying the very best quality of milk. Would not it be better to aim at a first class standard of milk instead of grading milk into classes ? Mr. Trotter mentioned about the power of stopping supplies, and the municipalities should have that power. Well, I think both Liverpool and Manche ter have the power of stopping supplies, and we in Liverpool have exercised it on occasion. I remember on one occasion a man said, " Oh, I do not care, I will send it to London" ; but he found in a very short time that he could not send it to London, and then he came to us and said to us his milk was going down the gutters and he did not know what to do with it. We said that that was a very easy matter to be put right, and we told him to improve it, which he did, and he was allowed to sell it. I would like to ask Colonel Brittlebank if the new Milk and Dairies Act will not limit the powers that we have at the present time. At the present time we have power to go into the dairies and examine the milk and also the cows, but I understand under this new Act we will not have that power, the power will be with the local veterinary inspector and not with the inspector of the district to which the milk is going. It is going to do more harm than good if that is so. Again, I think with regard to veterinary inspection—and I am speaking on delicate ground—veterinary inspection in the country should be in the hands of permanent veterinary inspectors, permanent men, and not part-time men. With all due respect to the part-time man—he may be doing very splendid work—it seems to me that the man whose milk he has to examine may be his best customer in the district, and I think one must look at it from that point of view. If the part-time veterinary inspector is going to report on the milk I think there ought to be some power for a permanent official to go in and look at the matter from his point of view. I only wanted to mention these points because I think they are rather important and I am very pleased indeed to have heard the discussion this morning, especially having regard to the broad-minded way in which it has been carried on. (Applause).

Dr. J. T. MACNAB, Medical Officer of Health, Stafford : I feel, after what Dr. Williams has said, that perhaps I should not have risen. I represent only a small burgh, but I have been able to get graded milk started by visiting the farmers, not in the morning, but in the afternoon. I told them I did not wish to teach them their business—just to bring before them a point of view they had not got. I think the medical officers of health and their staffs have a very great work before them in educating the public so that the demand for good milk will be encouraged. In my case I said to the first man who took this up, " If you produce Grade A. milk I will get my welfare and maternity committees to take their supplies from you " ; and to the second man I said, " I have an isolation hospital. The contract for the isolation hospital shall be for Grade A. milk only," and he secured that contract. I think local authorities can do a great deal by offering contracts for supplies of Grade A. milk. I also think the health visitors could do a great deal in educating the mothers of the poor particularly. With regard to the price demanded from the poor, in my town, unfortunately, a firm has introduced sterilised milk and they are demanding the same price as my people charge for Grade A. milk, and, by canvassing, they secured within ten days a good milk round, so that that shows the poor people can pay, and it was because this man said the milk would keep that it was sold. I think it is quite untrue to say that it won't reach the poor. Through the welfare and maternity centres it has already reached them. Mothers used to complain about milk not keeping, but they did not go to the farmer or the salesman, they went to the welfare centre and they found it was cheaper to buy milk that would keep. With regard to the sedimentation test, or the test with cotton wool, I find that all the farmers now-a-days in our district strain their milk, but I believe that milk cannot be clean, and even although it is heated and pasteurised, why should young children drink cooked manure in their milk ? The

importance of the cowshed production seems to me to be fundamental. If the milk is not clean to start with, nothing else matters. I find that the bacterial test is of considerable value. I must admit also that I have gone to a dirty place hoping to get a bad sample, but by luck I have got a surprisingly good one. I am perfectly certain, however, from what I have seen, that by using the bacterial test one can pick out the bad sheds quite easily. With regard to pasteurisation, I think it is yet to be shown that the important things like the phosphates and the lime salts in the milk are not interfered with by pasteurisation, and the bacteriologists are not yet sure whether it will kill the tubercle bacillus without affecting the milk. I think the milk will have to be bottled. Pasteurised milk, if it is not bottled, will not prevent people handling the milk and infecting it with infectious disease. With regard to our grandfathers' methods, it has been pointed out to me our grandfathers had a great advantage in respect that they had constant labour; now-a-days the people do not stay as they used to. There is great advantage in having employees who stay and get into the work thoroughly. (Applause).

Mr. HUGH BEGG, F.R.C.V.S., County Veterinary Inspector, Lanarkshire: I am sorry I did not hear the paper which was read, and I only heard part of the discussion which has taken place during the last quarter of an hour, but it occurred to me when the Chairman of the Public Health Committee for Liverpool was speaking with regard to supplying the best milk to the poorer people of the country that probably I could give you some interesting material with regard to what we are doing in Lanarkshire. In my view the milk producer has all along allowed too much of the profits to go into the hands of the middleman. It has been my chief concern to get as many graded herds as possible—not Grade A. herds—and simultaneously with this work we are personally attaching importance to the need for supplying the various provincial towns with tubercle free milk, and we are actually pushing on and considering the question which farm is the best adapted and the most suitable place to supply all these rather more populated districts. I am going to tell you of one of our certified herds to-day which is supplying certified milk on the Clydeside for an area of four or five miles at 4d. per gallon more than the ordinary price, and it is paying the farmer quite well. To-day he is making upwards of £700 and £800 more than he used to make when he sold it wholesale. This man is actually selling 15 gallons a day to miners who take bottles down the pit, and they find that they can take that certified milk down the pit and it will keep, and it is interesting to note that not a single ounce of milk was taken down the pits before. These men are taking down the certified milk instead of cold tea. What I wanted really to say was that we feel if you are going to produce clean raw milk in the way suggested by the man who came from the north a little time ago, we must try and get as many herds graded as possible. And I would also like to put forward my view in connection with the matter of better premises. I am not one who wants palatial buildings, but no one will make me believe that it is an easy job to produce milk in bad premises. (Applause). But what I would ask the sanitary inspectors to do, in so far as they have the power in their own districts, is to cause alterations or modifications of byres to be carried out, but I would plead with them to be as wide minded as possible, to try and be content with things we can get for nothing, such as God's fresh air. If they would simply split the roofs of their byres and let in plenty of light, and see, if the cubic space is small, that the ventilation comes in in such a way that there are no draughts, I think they would get the best out of their byres. I can take you to a certified herd now where they have only 350 cubic feet, and I do not know of a byre where the work is better done than it is in this case. But what I want to emphasise is this, that if the farmers would try and draw into their own pockets that amount of profit which goes to the middleman it would be to the benefit not only of the farmer but of the consumer. I think it is a scandal that a middleman taking 60 gallons of milk should actually get £800 to £1,000 a year for selling one man's milk.

Councillor J. WOOLLY, Chairman of the Health Committee, Ilkeston: What has struck me as a layman is this, what we desire and what is necessary in the interests of the community is education, and we must stick to education. These petty jealousies must become a thing of the past in the interests of our common humanity. I do not mind upon whose shoulders the responsibility of controlling this business is put so long as their hearts are in the right place, and the official responsible must approach this matter not as a detective of the police force but as a friend of the producer. That to my mind is the whole crux of the matter. I think if the person responsible for the inspection of milk, to see that it is produced clean and pure, would start by having a conference similar to what we have had this morning with the farmers, he would do a great work, and convince the farmers that the primary object is to produce the real thing, not to secure prosecutions in order to get convictions. That is not what he should be out for. I think if he could come into close personal touch with the farmers through their organisations, and give them the benefit of his expert knowledge, they would appreciate that and they would come to the conclusion that this expert was their friend and not their enemy. (Hear, hear). I think by so doing they would accomplish a great work and help the local authorities to get what they desire. I was very much impressed with what my friend from Stafford said. I think if the medical officer of health was to impress upon his staff the importance of education, and they were to use it in every way possible, we would get a better state of things throughout the length and breadth of this country. There are some of us who say we are not guilty in this respect, that the person who goes out to buy milk and goes out with a filthy jug is the person responsible, but you know that the retailer does not take the precautions he ought to do, and it is perhaps through ignorance. If he was educated to see that he was offering something that may be a danger he would take better precautions. I think we have done well in this discussion this morning, and I sincerely hope that we shall all go back and be determined that we shall educate from top to bottom everybody concerned, with the view to improving the milk supplies throughout the length and breadth of the country. (Applause).

(To be continued.)

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PLANT POISONING.

The admirable and, as far as our present knowledge goes, exhaustive paper on the subject of plant poisoning which was presented to the Association at the Cambridge Congress by Professors Craig and Kehoe, sets forth in a concise form the main facts at present available in this connection as they occur amongst domesticated animals in this country. At the same time, however, the paper emphasises the remarkable limitation of our knowledge of the subject and the urgency of the need for exact experimental work to place this study upon a more satisfactory basis.

The practitioner in his daily work is made acutely aware of this need with surprising frequency under circumstances in which plant poisoning may, or seemingly must, be incriminated as the cause of the condition for which his services are sought. The pathologist, too, in examining morbid specimens, not infrequently finds himself at an even greater disadvantage.

The chief reason for our lack of knowledge is that the importance of the subject has not been fully realised. It is impossible, at present, to form even a vague estimate of the annual loss sustained from plant poisoning, but it is evident from the experiences related by contributors to the discussion on the paper that it is considerable—certainly far more serious than is generally supposed.

One of the most interesting features revealed by the discussion is the probability that some plants are harmful which have hitherto escaped suspicion, while others have been incriminated upon very slender evidence. It appears that a problem of exceptional difficulty is presented by the existence of the latent period which elapses between the ingestion of some plants and the appearance of symptoms.

With the increased facilities for research that are now available to the profession, it is to be hoped that a systematic attempt will be made to study the whole question. Spectacular results are not to be anticipated, but it is safe to assume that such an undertaking would produce a steady flow of valuable information. Even in connection with the properties and actions of those plants which are regarded, by general consent, as poisonous, there are many minor points of difficulty which could readily be solved by careful experimentation.

(Continued at foot of next column.)

REVIEW.

Official History of the Army Veterinary Services in the Great War.*

(Reviewed by MAJOR-GENERAL SIR FREDERICK SMITH, K.C.M.G., C.B., F.R.C.V.S.).

First Notice.

Official histories as a rule are not attractive, they contain a bare matter-of-fact record of meticulous accuracy but wanting in soul, for the personal element is absent. When fighting forms the subject of an official record these conditions are accentuated, for the account has to be given, hour by hour, in minute fractions from an immense canvas; the personal element is absent, for the story is built up from information furnished by others. Fortunately, histories of the ancillary services employed in war are free from these disabilities; they can be written so as to present the account as a whole. The story can be rendered complete, even attractive, to the student and the lessons can be deduced without effort. The grave disadvantages of an official history are that unpalatable truths cannot be told and incompetence is shielded.

In the Veterinary History of the Great War—which we may be pardoned for saying is long overdue—we have presented to us a picture of the veterinary operations in various parts of the globe, written, with exceptions to be mentioned presently, by officers who either conducted or took an important part in the events. Each sphere of the war is dealt with in narrative form by the officer who alone knew the full difficulties and anxieties his service experienced. This statement, however, must be tempered by the regret we all feel at the absence from this history of any account from the pen of Major General Sir John Moore and Major General E. R. C. Butler. Both officers held positions of great responsibility during the war, both were promoted for distinguished service in the Field, and both were retired under the age clause before this history was undertaken. In the case of General Butler we are fortunate to have an

(Continued from previous column.)

On the other hand, as Dr. Andrews has reminded us, there are numerous intricate problems the elucidation of which calls for the joint effort of the pathologist, the chemist and the botanist, and perhaps also of the physiologist and the pharmacologist.

The profession is indebted to Professors Craig and Kehoe for drawing the attention of those who are in a position to help to a problem of deep interest and great practical importance.

* "History of the Great War based on Official Documents. Veterinary Services." Edited by Major-General Sir L. J. Blenkinsop, K.C.B., D.S.O., Colonel Commandant R.A.V.C., and Lieut.-Colonel J. W. Rainey, C.B.E. H.M. Stationery Office, Adastral House, Kingsway, London; 120 George Street, Edinburgh; York Street, Manchester; 15 Donegall Square, Belfast. London, 1925. pp. ix.+ 782. Price 21/-

account of his work by his second in command, Colonel A. G. Todd; in the case of General Moore, his Staff Officer retired shortly before his chief.

We have prepared the reader for the disappointment he will naturally feel on finding that neither of these distinguished officers takes part in this monumental record of the services rendered by their Corps, and to which by their outstanding ability they have so largely contributed.

The Western Front was naturally the political front of the war. No other successes would have been of avail had the war in France and Belgium been decided against us; yet in these countries the operations were mainly those of position, while in Palestine, Mesopotamia, S.W. and East Africa, they were wars of mobility and, therefore, from a veterinary standpoint of the deepest interest. On the other hand, the Western Front, from its proximity to this country, was in due course equipped in the most up-to-date manner, nothing was withheld to render it the most complete machine for the care of sick and wounded animals that has ever been in the Field. It won praise from both friend and foe of the veterinary service, and we would naturally have wished to know from the pen of its able director and organiser that which only a personal intimate knowledge can afford.

It must not, however, be supposed from these remarks that Belgium and France have been neglected in this history, far from it; we are presented with a picture of the work accomplished, and are gratified for the information recorded. It must never be forgotten that the value of publications such as these is educational, they are intended to teach and convey lessons to this and succeeding generations. It is usual to say as regards principles that war has nothing new to teach, and it was Napoleon who said he learnt nothing in his last battle that he had not learnt in his first. Students of history know how true this is, yet we venture to predict that, when the veterinary record of the campaign in German East Africa is read, something new will be found, what we are compelled to call, for want of a better term, the veterinary strategy adopted by the enemy.

It is well for the reader to understand that official publications are produced at the cost of the taxpayer, and a great deal of formality has to be gone through before those who hold the purse strings can be prevailed upon to spend money on publishing books. We know nothing more of the inner history of the transactions connected with the work under review, than that the number of pages was cut down below the necessary minimum; type, paper and substance of the history had all to be settled before the serious work of writing and editing could be attempted. It is unfortunate in this respect that steps were not taken immediately on the conclusion of hostilities, to secure from the principal actors an account of their stewardship, especially as the spending department had sanctioned the publication of the history. The Medical Service in the matter of its history was dealt with generously, and the work was started much earlier when money was more freely sanctioned. Doubtless they had their historians ready to hand; we had not.

If the delay resulted in Lieut.-Col. Rainey's services being secured it was worth it. He had seen service in France and had prolonged experience of the War Office.

The chapters from his pen on the preparation for war, mobilisation, provision and training of personnel, administration, the A.V.C. Depôt, animal diseases, animal management, sea and land transport and the economical disposal of the dead, are all based on an intimate personal knowledge of these questions; they are object lessons in clarity of expression and models of accuracy. In addition, this officer, as the senior editor tells us, had the duty of co-ordinating the various parts of the history and preparing them for publication.

Major General Sir Layton Blenkinsop, whose services were rendered voluntarily, does not indicate his share in the production of this volume. All the manuscript passed through his hands, while the invidious task of cutting one's coat to the available cloth and deciding what must go in and what, regretfully, has to be omitted for want of space, fell to him. In his preface he tells us the names of the authors of the various chapters; the great care taken to ensure accuracy in describing events which occurred some years previously, and the difficulties in dealing with records of the various areas of hostilities, in order that they might harmonise in style and balance. He regrets his inability to insert the names of all officers referred to by the various contributors, as the names were not always given. This is a point we equally deplore: if there is one thing a man appreciates more than another it is a mention by name; it is often the only reward which can be given him for services of outstanding merit. The subordinate officers will feel less discouragement when they learn that the Directors are little better off. We believe we are correct in saying that General Moore's name appears once and General Butler's twice in the text of this history, while Brig.-General Eassie's name, and those of other senior officers, appear only in the preface.

Before taking up a general notice of the book, we are compelled to draw attention to the absence of maps. No doubt the question was one of expense, but the maps must exist in the official history of the operations, and it is a pity that those bearing on the veterinary work were not rendered available. The military student preparing for examination, will, of course, consult the maps in the volumes dealing with operations, but the practitioner, who we hope will read this record of work in which he played his part, has no such facilities.

The Secretary for Scotland (Rt. Hon. Sir John Gilmour, Bt.), has consented to open formally the new buildings of the Royal (Dick) Veterinary College, Edinburgh, on the afternoon of Monday, 19th October.

Though the foundation stone of the new buildings was laid as long ago as July, 1914, the war caused innumerable delays; and it has only been during the present year that it has been possible to complete the furnishing of class rooms and laboratories.

ABSTRACTS.

Colonic Anæsthesia in Dogs.

The author recommends, as a safe and convenient method of inducing general anæsthesia in dogs, a preliminary dose of morphia followed by the introduction into the colon of a mixture containing three parts of ether and one part of olive oil. The morphia is injected under the skin in a dose of 0.01 gm. of morphine sulphate per kilo body weight. An interval of an hour is then allowed, after which the dog is placed on the table and a well lubricated soft rubber catheter is introduced slowly into the rectum and colon for an average distance of 7 inches. The ether oil mixture (one ounce of mixture per 20 lbs. body weight) is allowed to flow in during four to six minutes. Ether is usually detected in the breath before the last of it has been introduced into the colon, anæsthesia being complete in an average time of thirteen minutes and lasting from one to one and a quarter hours.

Observations of the pulse and respirations show that these functions are less disturbed than in inhalation anæsthesia. There is a quite remarkable absence of salivation and of any movements of the body in the second (excitement) stage.

At the end of the operation a small catheter is introduced beside the original one. The latter is withdrawn somewhat and the animal is washed out by water introduced through the small catheter. This is followed by a rapid return to consciousness. There are no objectionable after effects.

BECKMAN, H., *Journal of the American Veterinary Medical Association*, 1925, July. N.S. Vol 20, No. 4, p. 522.

Slowing and Block in the Heart under Digitalis in Animals.

[A. R. CUSHNY and K. Y. YU, in the Journal of Pharmacology and Experimental Therapeutics.]

Slowing of the pulse under digitalis treatment was observed by Withering in 1785 and though it was soon pointed out that in some patients the pulse was unchanged in rate under the treatment, this seems to have been forgotten, and throughout the nineteenth century the statement is found that digitalis slows the pulse. Only of recent years has it been realised that in a large proportion of patients the rate of the heart in normal rhythm undergoes no significant change under treatment with digitalis even when given in the largest doses which can be tolerated without symptoms from the alimentary tract or elsewhere. The slowing in most cases of normal rhythm is due to the stimulation of the inhibitory centre, though this may sometimes be aided by action on the muscle of the heart itself. The nausea and vomiting, which often put a term to the treatment, have been shown by the work of Hatcher and his fellow-workers to arise from the vomiting mechanism being affected by the drug after its absorption. It seems plausible that the presence or absence of slowing in man may be determined by the relative susceptibility of these mechansims, those individuals reacting with slowing in whom the inhibitory mechanism is more susceptible, while others in whom the vomiting function is more sensitive than the cardiac inhibitory, cannot be treated with sufficient amounts to induce change in the pulse rate. In cases of accidental poisoning in which the nausea and vomiting does not limit the development of the cardiac effects, slowing of the pulse seems to be well marked, which would support this view, but accurate observations of these are too few to determine the question.

In the dog and cat, slowing of the heart under digitalis has been observed ever since experiments on the subject have been made; nausea and vomiting also occur, but of course, do not prevent the use of large quantities of the drug. There seem to be no definite statements as to the degree of slowing obtained from digitalis in the rabbit, in which vomiting does not occur, but it is certainly less striking.

In an earlier investigation one of the authors obtained slowing of the dog's heart from the digitalis series almost invariably except when ectopic rhythm was present; auriculo-ventricular block was frequently present. Since then, in occasional experiments, slowing has not been observed so often, and this seems to have been the experience of others, to judge from enquiries and from casual statements in the medical press.

In the hope that some light might be thrown upon the subject, the authors have carried out a considerable number of experiments upon normal animals with digitalis. It was also of interest to determine whether there was any difference between the various members of the digitalis group in regard to the slowing of the heart, and they therefore employed several of them, particularly the more recently introduced pure principles. The preparations actually used were k-strophanthin, prepared by Sir Thomas Fraser, scillaren, cymarin, erythrophlœine hydrochloride, and Merck's digitoxin, the last an old preparation which was obviously far from pure.

MYOCARDIOGRAPHIC EXPERIMENTS ON DOGS.

Twenty-four experiments were performed on dogs in which the movements of the right auricle and ventricle were recorded independently by the myocardiograph. In the first two of these under strophanthin the maximum slowing was 3 and 7 per cent. respectively, and this was so divergent from previous results that it was obviously necessary to control the method more closely. Reversion was therefore made to the anæsthetics previously used and since then more or less pronounced slowing was obtained in almost all experiments. The anæsthesia must be complete, but at the same time not so deep as to depress unduly the inhibitory cardiac centre. It must be sufficient to prevent any reflex movements during the operation, and these are especially liable to occur during the opening of the thorax; if move-

ment occurs at this time, digitalis and its allies injected subsequently cause less slowing than usual or none at all.

In later experiments the method of inducing anæsthesia was as follows: Morphine hydrochloride was injected hypodermically in a dose of 0.04 gram. per kilogram two hours or more before the experiment, and an hour later 0.2 gram per kilogram of chloretone in 0.3 per cent. solution in alcohol was injected intramuscularly. The animal was then left for at least an hour in deepening anæsthesia; during the operation a small amount of ether was inhaled, but was stopped as soon as the thorax was opened. This slow production and long duration of anæsthesia before the actual operation is said to be of importance, as when this method was employed the slowing was well marked. There was almost always some acceleration of the pulse during the operation, especially as the pericardium was opened.

In most of the experiments, when the slowing was well developed, the vagi were cut or were paralysed by the intravenous injection of atropine.

The drugs were injected intravenously, and in a certain number of the experiments in a succession of small doses so as to give a slowly increasing concentration, such as occurs from gradual absorption; in others a single injection was made of a dose sufficient to arrest the heart in one to two hours. In all cases the experiment was continued, with fresh injections if necessary, until some definite cardiac irregularity occurred.

Some of the results seem to suggest that a heart with a rapid rhythm, *e.g.*, 200, is reduced to a less extent than others in which the initial rate is lower, but there are many exceptions to this, a very marked fall (60 per cent.) occurring in some experiments in which the pulse before the injection was over 200. The "shock" pulse which followed reflex movements during the operation was not more rapid than those which proved amenable to digitalis; yet little or no slowing was observed in experiments in which it had occurred.

Slowing of the whole heart from inhibition of the pace-maker was found in twenty-two experiments out of twenty-four. In four of these it was less than 10 per cent., in three it amounted to about 15 per cent. of the initial rate, in three others to 20 to 30 per cent. and in twelve to thirty to 80 per cent. Pronounced slowing was not especially associated with any one of the drugs injected, nor was there any other constant factor that we could determine; neither the rate of the injection, nor the amount of the total dose seems to be the essential cause. Thus in one experiment eleven doses of 0.5 mgm. erythrophlœine were injected in succession and in the course of an hour induced slowing from 118 to 65 (45 per cent.), while in another case, a single injection of 1 mgm. strophanthin was followed in five minutes by a fall in the rate from 137 to 53 (59 per cent.).

In the refractory animals, the first change, apart from increased strength of contraction, was generally the appearance of ventricular extrasystoles developing into idioventricular rhythm. This is also induced eventually in experiments in which the slowing is well marked in the beginning, but only after a longer time and generally after larger doses.

Animals in which digitalis induces only insignificant slowing of the heart thus pass directly into the phase of increased spontaneous rhythm with little or no phase of inhibition. This might arise from an inherent greater spontaneity of the ventricle, but the authors rather ascribe it to diminished responsiveness of the inhibitory centre and this is supported by the observation that unless special attention is paid to the anæsthesia during the operation, this refractory form of reaction tends to be developed; apparently reflex shock induces prolonged insensibility of the inhibitory centre to stimulation by these bodies.

Partial *A-V* block occurred in ten out of twenty-four experiments. In seven of these, the block was preceded and accompanied by great sinus slowing, but in others in which an equal or greater sinus slowing occurred, block was absent; in one the sinus slowing was moderate, while in two experiments under strophanthin it was only about 5 per cent. when partial block appeared.

Great sinus slowing may prevent the appearance of *A-V* block by allowing the bundle fibres time for recuperation from each impulse. This was shown in several experiments in which there was great sinus slowing, but no block, and in which a more rapid rhythm was imposed on the auricle by a series of regular electric shocks; the auricle responded to each of these by a contraction, but the ventricle was unable to do so completely, so that intermissions occurred at intervals, or not infrequently half rhythm was observed.

S-A block (between the pace-maker and the auricle) was apparently present occasionally, for intermissions of both the auricle and ventricle were met with, which were almost exactly twice the length of the normal pulse interval, but in those cases there was generally marked slowing and the pulse interval varied a little, so that it was difficult to be quite certain whether the defect occurred in the pace-maker itself or between it and the auricular muscle.

Isolated extrasystoles were observed frequently, generally with some slowing of the rhythm, but often with no marked slowing. They originated about equally frequently in the auricle and the ventricle and seemed to be commoner under erythrophlœine and scillaren, but this may have been casual. Frequently they soon recurred and bigeminous beats were seen, especially in the ventricle. As the action developed further, trigeminous beats began; still later they developed into an irregular spontaneous ventricular rhythm. The extrasystoles were distinctly more frequent in experiments in which the slowing was marked, but also occurred occasionally when it was comparatively slight. The further development into bigeminous and trigeminous rhythm in the ventricle was more frequent in great slowing. It is obvious that the extrasystole arose in part from the increased spontaneity of the heart muscle, but that the slowing was also an important factor. Sometimes the

ventricular rhythm was mainly spontaneous, but at intervals an impulse from the auricle succeeded in causing a beat, which gave the appearance of an extrasystole in the ventricle.

A frequent stage in the experiments was a slow and rather irregular auricle along with a considerably more rapid, regular ventricular rhythm, the auricle being still under the control of the inhibitory mechanism and having developed little spontaneous rhythm, while the ventricle beat spontaneously. In some instances section of the vagus or atropine released the auricle, which now accelerated beyond its normal rate, became regular and gave the rhythm to the ventricle; this indicates that the dissociation of the ryhthms was at any rate in part inhibitory. In other cases the removal of the inhibition accelerated the auricle, but the rhythm of the auricle and ventricle remained independent, the block being due to the impairment of the *A- V* conducting fibres.

There are thus several varieties of dissociated rhythm seen under digitalis in moderate doses in the dog. The first is the block from simpler inhibition, in which the ventricle fails to respond to the auricular impulse at longer or shorter intervals and its rhythm is therefore slower than the auricular; this block generally disappears after atropine and both rhythms are accelerated together; in one observation it continued after section of both vagi and here there may have been impairment of conduction from direct action on the bundle. In a second form the auricle is slow and irregular from inhibition, while the ventricle has assumed its own rhythm and is regular and faster; atropine quickens the auricular rhythm and renders it regular and the ventricle now assumes the quicker new auricular rhythm, and abandons its independent spontaneous beating so that the normal sequence is restored. Or atropine may accelerate the auricular rhythm, while leaving the ventricular unchanged and the two chambers beat at independent rhythms. In one tracing under cymarin the rate of the heart was reduced from 175 to 120 per minute, and soon after the ventricle assumed a spontaneous rhythm of 165, while the auricle remained at 120. Then quite suddenly the auricle assumed a rate of 168 and the ventricle followed it, so that the rhythm became normal. The cause of the sudden change in the auricular rate could not be ascertained. It is of interest that the rapid rhythm of the ventricle was not transmitted to the auricle, but on the other hand as soon as the auricle assumed a higher rate the ventricle followed it. Here the block seems to have been one-sided only, impulses being able to pass from above downwards but not in the reverse direction; a similar observation was made by one of the authors in an experiment in which the rhythm of the ventricle was accelerated by rapid electric shocks, while the auricle maintained its previous rhythm unchanged, showing that the ventricular impulses could not be transmitted to the auricle, yet when the electric shocks ceased, the ventricle at once assumed the normal auricular rhythm, showing that impulses were transmitted from the auricle to the ventricle; in most unpoisoned hearts, when a more rapid rhythm is imposed on the ventricle by electric shock, it is taken up by the auricle after a few beats. In these exceptional cases in which this does not occur the transmission of impulses is less perfect in the one direction than the other.

It has been suggested that here there was no true "block" or impairment of conduction, but that the retrograde impulses from the ventricle failed to act in the auricle because they fell in the refractory phase of the bundle or the auricle. This is insufficient to explain the absence of reversal of the beat seen in some experiments and the authors have therefore been compelled to adopt the alternative view, that here the bundle is more readily penetrated by impulses from above than by those in the reverse direction.

In dogs the degree of slowing shows great variation, and this not according to the dose, but to varying sensitiveness of the inhibitory centre. This variation appears to be in part artificial, any reflex shock decreasing the response to the injection of these drugs greatly. In those cases in which the slowing is not developed early, the first change in the rhythm arises from the development of ectopic rhythm in the ventricle, which is no longer controlled by the inhibition.

The inhibitory block is often accompanied by idioventricular rhythm, and if the auricle continues to beat strongly enough at a different and slower rhythm, all the symptoms of the second toxic stage of action, including periodic variations in the excursion of the levers, may follow. These can be distinguished only by the elimination of the inhibition by atropine or section of the vagus.

Experiments on the Cat.

Six experiments were done on cats anæsthetised with paraldehyde (1.5 cc. per kilogram by the mouth) and ether during the operation, or decerebrated. The auricle and ventricle were attached by threads to levers and were thus recorded separately. In three of these the rate of the heart was reduced by only 7 per cent. or less, in the other three it fell from 12 to 32 per cent. When slowing was well marked, the ventricle generally assumed its own rhythm while the auricle maintained its slow inhibitory rate for a long time; this indicates that block was present, at any rate for impulses passing upwards from the ventricle to the auricle. In one experiment, there were phases of marked sinus slowing alternating with others of rapid rhythm. The tracings were thus similar to those obtained from the dog.

In two experiments in which the ventricular rhythm was recorded by the mercury manometer, slowing of 18 per cent. occurred in one, and of 56 per cent. in the other; in the last the rate fell gradually at first and then was suddenly halved, indicating almost certainly half-block in the *A- V* bundle.

In eight experiments under ether only a slow infusion of digitalis was made into the jugular vein until the heart stopped; the heart rate was not recorded but was counted by palpation. In three of these, the rate

fell only 5 to 10 per cent. in four, 20 to 30 per cent., only in one, 36 per cent.

In thirteen rabbits, anæsthetised with urethane by hypodermic injection, the rate was recorded with Hurthle's manometer in two, by a string attached to the ventricle in four, and by the femoral artery being attached to a writing lever directly in seven. The slowing was comparatively slight, never exceeding 16 per cent. and seldom 10 per cent. No block occurred in the tracings taken direct from the heart, nor was there anything to suggest its development in the other experiments. This is in accord with the generally accepted view that the inhibitory centre in these animals is less active than in the carnivora.

SUMMARY.

In the dog and cat, the digitalis series induces slowing and block more frequently than in man, probably because in the latter the drug has to be abandoned, owing to its effects on other tissues, which in many individuals are more susceptible than the inhibitory cardiac centre.

These animals also vary in their response, apparently owing to varying susceptibility of the inhibitory cardiac centre. When this is low, the spontaneous rhythmicity of the heart may be so much augmented by the drug that the rhythm becomes irregular from ectopic beats at a lower concentration of the drug than is necessary to arouse the inhibitory centre.

This unresponsiveness of the centre is especially liable to occur from reflex " shock " during the operation, and unless this is carefully avoided, no slowing or block may be induced by digitalis or its allies. The more perfect the anæsthesia, the greater is the inhibitory action as a general rule. The peripheral inhibitory mechanism is not at fault. In the rabbit there is little or no slowing from digitalis, probably from the weak activity of the centre in these animals.

When there is marked sinus slowing, there may be no sign of impairment in the *A- V* conduction, but on increasing the demands on it by accelerating the rhythm even slightly, its weakness is made manifest in block.

The expenses of this study were met by a grant from the Earl of Moray Fund of Edinburgh University.

The trustees have elected Mr. Norman Dobson, B.Sc., M.R.C.V.S., of Bradford, to the Centenary Post-graduate Fellowship at the Royal (Dick) Veterinary College, Edinburgh. The Fellowship, which is of the present value of £250, was founded by public subscription in 1923 to commemorate the hundredth anniversary of the foundation of the College, and Mr. Dobson is the first elected Fellow.

OBITUARY.

TAYLOR, CHARLES. Graduated London April 1st, 1880. Died at Lye Cottage, Brickett Wood, St. Albans, on 20th September, 1925.

CLINICAL REPORT.

Open Joint and Open Bursa.

(*S. J. Murray, in " Veterinary Medicine."*)

Case No. 1. A span of horses, on being turned loose in a corral to play, got into a kicking match,and when the contest was ended, it was found that one of the animals had received a kick on the right hind leg at the tarsal articulation with sufficient force to tear off the horny substance on the postero-internal surface of the joint, and the soft structures of the skin beneath it, leaving the bursa of the flexor pedis perforans tendon exposed, if not injured. No attention was paid to this apparently trifling injury for several days, when it was discovered that the animal was lame. A veterinarian was then called and treatment commenced. The usual method (antiseptics and hot moist bandages) was employed. Later astringent antiseptic solutions were freely injected into the cavity through the open wound, which was then about one-half inch in diameter. During the time that this treatment was under way, appeals for aid were sent out by mail and answers received from several noted outside veterinarians who were unable to see the case except through the eyes of the attending veterinarian. The answers received by mail were laid before the owner who happened to be a very intelligent gentleman. The diagnosis agreed on was open-joint with prognosis unfavourable, in fact, very unfavourable. The owner was advised to kill the animal, an eleven-year-old driving horse named Grover that the owner had cared for since the time it was a little colt. When the time appointed for the killing arrived, the owner balked, made a plea for an extension of time to consider the matter and called another veterinarian.

The animal was found in a standing posture, pulse accelerated, temperature 103.5°F., and anorexia complete. There was but very little swelling of the injured limb. History showed that the injury was received from an unshod hoof. Behind the horse were a flock of a dozen or more hens under the leadership of their masculine consort, taking turns at picking at the wound. After the chickens were driven away, it was found that drops (balls) of a sticky, yellowish substance of sufficient consistency to continue their globular conformation until they reached the floor were coming from the wound at the rate of about twenty per minute. The diagnosis was open bursa. Prognosis was, " Well, we will see ; it ought to get better."

The animal had been fed on the usual amount of hay, corn and oats which he finally refused, but this refused food was allowed to remain before the animal so that if he so desired he might take a little nourishment. This food which he had been looking at and breathing upon for days and nights was ordered to be removed. Instructions were given that a little moistened bran and a new supply of hay should be offered and that the horse should be coaxed to drink

by being offered cold water every hour or two. Potassi nitras, grams xii, was prescribed to be dissolved in a little hot water and given in the drink twice a day. Pulverised cantharides, gram i, petrolatum, grams iv., was mixed in sufficient quantity and applied with plenty of rubbing to the surface of the joint from five inches above the wound to five inches below, all around the limb. Twenty-four hours later the discharge from the wound had ceased. The wound was closed by the swelling of the part due to the action of the cantharides.

The question was then asked, "What will become of the pus that can not now get away?"

"I don't know. There is something in his blood that may take care of it."

This would have been an ideal case for the use of polyvalent mixed bacterin. The animal ate what was offered and the temperature had fallen to 101·5°F. A little more of the ointment was applied over, around and below the wound where the parts were damp the day before at the time of the first application, on account of the moistening effects of the discharge. The owner was instructed how, on the fifth day following, to wash the part and when it became dry to keep it covered with a thin stratum of adeps or petrolatum. While we heard from this case from day to day, no further service was required. In the course of six weeks Grover was ready for gentle exercise and remained for years a living, active advertisement of what might have been a tragedy.

Case No. 2. A fourteen-hundred-pound pregnant farm mare received a kick from a horse shod with a "never-slip." Two punctures were made in the antero-external surface of the tarsal articulation, penetrating the synovial membrane at two points, about one and three-fourths inches apart, and one directly above the other. These two punctures for several days had been injected with a solution of dip or creoleum. The injections into the synovial cavity were ordered to be discontinued, the animal placed on a diet of light food, and the ointment and internal medication as used in the aforementioned case were recommended. Only one visit was made to this case, it being located too far away and no further good could be done by seeing the animal again. Thirty days later the owner called up to inquire if he should continue to give those powders. He reported that the mare had a colt a few days before and that both mare and colt seemed to be all right. He was advised to discontinue the powders which he had been giving for thirty days. He had been having the prescription refilled. Some months later, having an opportunity to examine this mare, it was found that a spavin had developed on the uninjured limb. This might have been avoided by the use of a sling to carry some of the weight during the period that the injured limb was out of service.

We have found cases where, if the horse was placed in a sling, it immediately lay down in it and the sling was lowered to the floor and then taken off the animal, which would be allowed to rest until satisfied, when it would assume a standing posture of its own accord and appear very much improved. If the horse was my own and I saw that he was tired of standing and afraid to or not having sense enough to get down and rest his weary limbs, I would slip him into a casting harness and put him exactly where I wanted him, but things are different where the animal belongs to someone else.

Case No. 3. I can distinctly remember a case under treatment on account of an inflammatory condition of the bursa of the flexor tendons of one posterior limb, at the fetlock. The owner was hard in the head and could not see it my way. To him a horse that could stand was worth more than a horse down. Happening to arrive at his barn late at night while the hired man was in charge, inquiry was made as to the sick horse and being informed that the animal was suffering awfully and was not going to last much longer, permission was asked to lay the horse down. The request being granted, the forefoot on the side towards which the horse was leaning, after being roped, was raised from the floor by pulling the rope over the animal's back to the side from which he leaned. The animal slowly sank to the floor, when the rope was removed from the foot and the head untied from the manger. The next morning, on answering a call to come to the barn at once, I was met with angry looks and harsh words. The horse was still down and had pushed himself out of the stall into the aisle so as to interfere with the working of the men who had to climb over the horse to go from the front to the back of the barn. The men were asked to roll the animal over on its other side, which they did. The horse got up, shook himself and walked into his stall and from that time on got up and down of his own accord and finally became a useful animal.

We have seen a horse with a crippled hind leg, bracing himself with his head in a corner and the hip of the uninjured side leaning against a partition until the uncontrollable shiver of death shook the partition, the vibration of which was transmitted to the timbers of the barn, causing the whole building to tremble, but only for a minute, when he went down with a crash and all was still.

(*To be continued*).

FRANK GARNETT MEMORIAL FUND.

TENTH LIST OF SUBSCRIPTIONS.

	£	s.	d.	£	s.	d.
Amount brought forward from ninth list				334	18	6
National Veterinary Medical Association	26	5	0			
Midland Counties V.M.A.	5	5	0			
D. Lloyd-Jones	1	1	0			
Western Counties V.M.A. (cont.)						
H. K. Roberts	0	10	6			
W. Roach	0	10	0			
				33	11	6
				£368	10	0

NOTES AND NEWS.

Diary of Events.

Oct. 8th.—Central Veterinary Society. Annual General Meeting.
„ 13th.—Meeting of the Derbyshire Division at Derby.
„ 14th.—Annual Meeting of the Scottish Metropolitan Division at Edinburgh.
„ 19th.—Opening Ceremony, Royal (Dick) Veterinary College, Edinburgh.
Nov. 30th.—Notification of changes of address to Registrar, R.C.V.S.
Dec. 1st.—R.C.V.S., Examination Fees (December Exams.) payable.
„ 8th.—R.C.V.S., Written Examination.
„ 10th.—R.C.V.S., Oral Examinations commence.

Costs amounting to £3 were awarded against the police at Highgate in favour of John Haynes, a cartage contractor, who was summoned recently as the owner of a horse which was alleged to be unfit.

Haynes said it was persecution on the part of the police to have brought him to court, and he called two veterinary surgeons, who disputed the police evidence that there was a sore on the horse's withers.

Haynes asked the magistrates to satisfy themselves on this point.

The magistrates saw the horse, and on their return dismissed the charge, and, as stated, awarded Haynes £3 costs.

At the last monthly meeting of Milngavie Town Council, Bailie Paterson submitted a minute of the Public Health Committee dealing with the Diseases of Animals Acts, the Milk and Dairies (Scotland) Act, 1914, and the Tuberculosis Order, 1925. He stated that after full discussion the committee unanimously decided to recommend that the Town Council should agree that a duly qualified person be appointed to act as veterinary inspector for the county and the burghs therein, his emoluments to be borne by the local authorities concerned. The committee further recommended that the Council should hold over meantime consideration whether the veterinary inspector appointed should also act as veterinary inspector under the meat inspection regulations. The Council unanimously approved of the recommendations.—*Glasgow Herald.*

" Great Britain may now be declared free of foot-and-mouth disease. The last outbreak, which occurred on August 17th last, was merely an extension of that at Southampton, which prevented the Minister of Agriculture from making a welcome announcement to the House of Commons, and it was vigorously tackled and overcome. The Ministry of Agriculture, who, in face of much opposition, persisted in the policy of slaughter, is gratified with the vindication of its methods, and is particularly satisfied that the country should be free of the disease at this moment, when so many agricultural shows are about to be held. It will take some time before foreign countries raise their restrictions on the import from this country of pedigree cattle, but many of these should disappear in the early autumn.—*The Scotsman.*

Erratum. Mr. T. Eaton Jones is represented, in the report of his contribution to the discussion on Professor Wood's paper on " Rations for Normal Animals " (published in the *Record* of September 12th) to have said that the Liverpool Corporation horses receive 10 lbs. of hay per day. This should read " 16 lbs. of hay per day."

It was stated at a meeting of the Oswestry Farmers' Union, held on September 9th, that the dipping of 1,300 sheep was held up for an hour at the foot of the Berwyn Mountain because a Government inspector insisted on the sheep being pushed under the head and ears. Five sheep died in the course of the dipping operations. The farmers sent for a veterinary surgeon, who held a *post-mortem* examination and found the sheep had died from swallowing the dip. It was only when the inspector relented somewhat that the farmers allowed their sheep to be dipped. It was reported that twenty sheep had since died.

Mr. Scott Bickerton said they did not want to kill their sheep to save scab, and their feeling would be relieved by a Government inquiry.

Mr. W. I. Morris said farmers wanted to know if Government officials had the right to handle their sheep and mix the dip.

Mr. W. A. Fulton stated that after one dip in Montgomeryshire they lost forty-five sheep. A Ministry inspector was there and mixed the dip. If Government officials dipped farmers' sheep, the Government should take the responsibility for losses.

Mr. Morris: An inspector from London made us immerse the sheep.

The Chairman: I should have dipped him.

Mr. Morris: Farmers have threatened to do so if he comes there again.

It was decided to ask for a Government inquiry, and a committee was appointed to collect evidence for it.

CORRESPONDENCE.

The General Public and Veterinary Medicine: Necessity for a Properly Organised N.V.M.A. Publicity Committee.

To the Editor of The Veterinary Record.

Sir,—At the 1924 (Aberdeen) Congress, made such a real " live wire " affair by the characteristic thoroughness of our shrewd Scottish colleagues, a resolution (which had emanated from Capt. Hamilton Kirk at one of the meetings of the London Central Division) was considered, and it resulted in the formation of what was termed an " Organising Committee." For some unexplained reason the original title under which Capt. Kirk brought forward his bantling, i.e., a " Publicity Committee," a title strongly supported by Mr. G. P. Male (who stated that he had some time previously brought forward the same idea without success before his colleagues on the Council of the Royal College of Veterinary Surgeons), was turned down, and the " Organising Committee " title agreed to in substitution.

At all events, it was fairly well understood that judicious publicity, regarding the value of the work of the profession as a whole to the State and to the general public, was the object for which the members of the " Organising Committee " were selected.

How they have fulfilled their duty is best answered by the unexpected bombshell which they set before the Cambridge Meeting when, *nine months after their appointment*, one member is reported to have said that the Committee has " not done anything other than arrange some clinical prizes for students," and another asks for " the opinion of the Meeting as to what you wish us to do." The sum total of what was intended by the proposer of the resolution and his seconder is summed up in the two leading paragraphs of Capt. Kirk's letter as read before the Council and published in the *Veterinary Record* account of the proceedings, viz.:—

1. To educate the general public to a better appreciation of the veterinary profession, as regards its importance and utility to the State; its knowledge; and its scientific training.

2. To advertise (discreetly and unassumingly) the profession and its activities, in a precisely similar manner to that adopted by the medical profession.

That such is necessary is still further illustrated and supported by the Medical Officer of Health for the City of

London, Dr. William Howarth, C.B.E., M.D. who, in an article on "The General Public and Veterinary Medicine," which he contributed to the September issue of the *Veterinary Journal* states that "it is probable that the work of the veterinary profession is only assessed at a partial value by the majority of people, since the ramifications of the science are as yet not satisfactorily recognised"—and, in a later paragraph, referring to the general public, he states that "they failed to recognise the numerous side lines (perhaps they should be termed main lines) which were to become prominent, provided development proceeded in a thoughtful and satisfactory manner." *That development has taken place, and one may with reason wonder whether such activities as those enumerated below are yet appreciated at their full value. If not, it becomes a matter for consideration whether the responsible professional Association might not adopt some method whereby they could be made kn wn*

Why do we not organise from headquarters a judicious press campaign? Agriculture and the live stock industry of Great Britain could not possibly exist without proper disease control, and who is so fitted to exercise that control as the veterinary profession? Why, therefore, should not this be universally recognised? The answer lies with ourselves. The general public, with the exception of those who have actually owned sick animals, have not the slightest idea of the scientific training necessary to qualify as a Veterinary Surgeon,—nor would one mind so much about that were it not that this ignorance often extends to magistrates and others of the so-called educated classes, to the detriment of ourselves. Doubtless, now that the "Organising Committee" have had their attention drawn definitely to what may be considered their duty, *i.e.*, the judicious education of the general public to a better appreciation of the scientific training and work of the veterinary profession, they will be able to render a good account of what they have done in the twelve months behind them, when they report again to the next Annual Congress at Dublin; and the profession will look forward in anticipation. At any rate, they will not have the excuse that they did not know or realise what their duties were.

The Press is a powerful organ, and it can be a great help. It can do in five minutes for us what would otherwise take years to accomplish, and we are foolish if we ignore this fact. To develop its power to the fullest extent the individual members should collaborate and send up their suggestions to this Committee for consideration and action if considered advisable; and the Committee should meet at very frequent intervals. It is a right possessed by every member of the "National," a right which he should exercise, to have his suggestions courteously considered by those whom his support has honoured by placing them in office.

Vis Unita Fortior is the motto of our profession—a motto well chosen by our sagacious forefathers, and one which we ought to keep before us morning, noon and night; alas, it is too frequently forgotten, and ludicrously inapplicable to our petty bickerings amongst ourselves.—Yours faithfully, FREDERICK HOBDAY,
165 Church Street,
Kensington,
London, W. 8.
22*nd September*, 1925.

Professor Glaister's Statement.

TO THE EDITOR OF THE VETERINARY RECORD.

Sir,—Would you kindly allow me to comment in the *Veterinary Record* on a statement of Prof. Glaister headed "Glasgow Veterinary College," reported in your issue of to-day's date. In that statement a comparison is made between the percentages of successes and failures of students of the various veterinary schools at the last July professional examinations, as follows:—

Glasgow: 73 per cent. passed; 27 per cent. failed.
London and Liverpool: 64 per cent. passed; 36 per cent. failed.
Edinburgh: 66 per cent. passed; 34 per cent. failed.
Dublin: 61 per cent. passed; 39 per cent. failed.

I desire to point out, as a matter of fact, that at this College the percentage of passes was 72, and of failures 28. It is also not improbable that some of the other calculations and statements are likewise open to question.

I would, therefore, suggest that those who are responsible for these statements should ensure that their statements are accurate and beyond dispute before they appear in print. Otherwise they will, when exposed, only do damage to the cause which their authors are striving to further.—Yours faithfully, J. F. CRAIG,
Veterinary College of Ireland,
Ballsbridge,
Dublin.
26*th September*, 1925.

Glamorgan County Council Appointment.

TO THE EDITOR OF THE VETERINARY RECORD.

Sir,—In your issue dated September 12th, an advertisement for a whole-time Veterinary Surgeon, to carry out the provisions of the Tuberculosis Order, 1925, appears from the above body.

The salary, £650 per annum, appearing in the first few lines, rivets the attention of those of us who would prefer a whole-time job with an assured income, but reading on comes the inevitable "snag."

Firstly, "Applicants must not be less than 35 years of age." This is surely stupid, as many of us qualified when 21 or little more, and now have several years' practical experience to our account and, further, is not the recent graduate likely to be more up in knowledge to examine milk, fæces, etc., than the older graduate?

Secondly, "must provide his own car," and yet be "liable to dismissal on three months' notice."

Further comment is superfluous.—Yours faithfully,
J. F. D. TUTT,
1 St. Cross Road,
Winchester.
22*nd September*, 1925.

"Humane Slaughter and a Visit to Holland."

TO THE EDITOR OF THE VETERINARY RECORD.

Sir,—Will Major Hobday explain why it is necessary to build a new abattoir before sheep can be humanely killed? I am not aware that it takes more room to stun a sheep than to cut its throat. It is a different thing in the case of pigs, which are more difficult to handle and control. I know that before long there will be a new section of the abattoir for pig-killing. But I hope sheep will not have to wait for humane killing until the new abattoir is built at Rotterdam?—Yours, etc., A. M. F. COLE,
30 Kestrel Avenue,
Herne Hill,
London, S.E. 24.
21*st September*, 1925.

"Army Veterinary Service."

TO THE EDITOR OF THE VETERINARY RECORD.

Sir,—I note that on page 794 of the *Veterinary Record* dated September 12th, 1925, under the heading "Army Veterinary Service" that I am shown under the name "G. V. Holding" as being promoted to Major; this was a clerical error in *The Times*, taken from the *London Gazette*, dated 4th September, 1925, and *The Times* have now corrected the error. I should be obliged if you could kindly have this amended in a subsequent issue of the *Veterinary Record* to read G. V. Golding as being promoted Major.—Yours truly, G. V. GOLDING, Major, R.A.V.C.,
c/o 9th Lancers,
Sarafand, Ludd, Palestine.
23*rd September*, 1925.

National Veterinary Medical Association of Great Britain and Ireland.

EDITORIAL OFFICE: 10 Gray's Inn Square, London W.C.1.

Cheques should be made payable and all communications sent to the General Secretary at the Offices of the Association, 10 Gray's Inn Square, London, W.C.1.